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A Comparison of Qualifications Based-Selection and Best Value Procurement for Construction Manager/General Contractor Highway Construction

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1 **A COMPARISON OF QUALIFICATIONS BASED-SELECTION AND BEST VALUE**
2 **PROCUREMENT FOR CONSTRUCTION MANAGER/GENERAL CONTRACTOR**
3 **HIGHWAY CONSTRUCTION**

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ABSTRACT

Faster project delivery and the infusion of contractor knowledge into design are the primary drivers for choosing construction manager/general contractor (CM/GC) project delivery. This paper focuses on the use of qualifications-based (QBS) and best-value (BV) procurement approaches, how and why agencies use each, and their associated opportunities and obstacles. Data for this study were obtained from a majority of federally funded CM/GC projects completed between 2005 to 2015. The findings are that BV and QBS projects characteristics and performance have no statistically significant difference. The choice of BV or QBS coincides with the agency's CM/GC stage of organizational development and influences of non-agency stakeholders on the CM/GC process. When agencies and the local industry are new to CM/GC, they were found to use BV as it is closer to the traditional procurement culture and it is perceived to result in a fair market project price. Alternatively, agencies and local industry partners with an established history of using CM/GC were found to choose QBS. The low level of design at the time of procurement, means that assumptions relating to risk, production rates, materials sources, etc. may be too preliminary to secure a reliable price. The use of BV procurement was found to pose a risk to innovation and increase negotiation efforts. Qualitative trends from the project data, interviews and literature point to agencies using QBS for the majority of CM/GC project and BV on CM/GC projects with lesser complexity or more highly developed designs at the time of selection.

Keywords: Procurement; best value; qualifications-based selection; selection criteria; construction manager/general contractor

INTRODUCTION

Construction manager/general contractor (CM/GC) is gaining momentum of use among highway projects across the U.S. The primary benefits of CM/GC are risk reduction, opportunities for innovation, early cost certainty, schedule optimization, and improved design quality achieved through early contractor input (3,5). CM/GC successes, therefore, hinge upon the ability to choose the most suitable contractor through the qualifications-based selection (QBS) or best value (BV) procurement process. This paper provides a discussion of the CM/GC procurement process, what selection tools are required in order to successfully select the most qualified bidding contractor, and the opportunities and obstacles that align with QBS and BV procurement and their differences.

To explore differences between QBS and BV procurement for CM/GC, this study conducted a thorough review of literature and agency manuals, conducted a survey of completed projects, and conducted interviews with managers from projects that were purposefully selected from the survey dataset. The project data for this study includes 29 CM/GC highway projects, 13 QBS and 16 BV, completed between 2004 and 2015. These 29 projects represent the majority of federally funded CM/GC projects during this time period.

The findings of this paper are that while statistically significant difference in project characteristics or performance was found between BV and QBS in the dataset, the reasons that agencies chose each procurement method are not random and appear to coincide with the CM/GC experience levels within the state. This paper will briefly introduce CM/GC as a project

1 delivery model, discuss the differing methods for procuring contracts, introduce current agency
2 CM/GC procurement policies and procedures, present the results of the data collection, and
3 finish with a discussion on how the resultant findings impact the highway construction industry.
4

5 **CONSTRUCTION MANAGER/GENERAL CONTRACTOR PROCUREMENT**

6 In the traditional design-bid-build (D-B-B) highway delivery method, the agency retains
7 ownership of design and procures a contractor by price after design completion. In CM/GC, the
8 agency also maintains ownership of design. However, the agency procures a CM/GC early on in
9 the project to aid with design development. There are two phases to the CM/GC contract:
10 preconstruction engineering services and construction. The CM/GC is selected for
11 preconstruction services through a QBS or BV process due undeveloped nature of the design at
12 the time of selection. When the design has advanced to a point of mutual satisfaction between
13 the owner and CM/GC, the contractor and agency agree upon a price for construction.

14 To aid in price negotiation, the agency hires an Independent Cost Estimator (ICE). The
15 ICE develops an estimate to compare against the contractor price to ensure that the agency
16 receives a fair market value for their project (3). The agency uses independent estimate to aid in
17 negotiating a guaranteed maximum price (GMP) with the CM/GC. Note that this paper is using
18 the term GMP to mean the construction contract price but agency terms vary (e.g., construction
19 price, target construction price, lump sum, etc.). The contractor is initially awarded the contract
20 for preconstruction services. They are later awarded the construction contract once the design is
21 complete and a GMP is agreed upon (4). However, agencies select the contractor for both
22 preconstruction services and construction at the same time. This paper focuses on this initial
23 selection of the CM/GC.

24 There are a number of common variations to the CM/GC procurement process. The
25 most familiar to the highway construction industry, and the focus of this research, are the QBS
26 and BV procurement methods. The QBS procurement process is defined by a review of the
27 CM/GC's statement of qualifications proposal, which may include specialized qualifications,
28 firm experience, past performance, key personnel, project innovations. It includes no evaluation
29 of monetary elements for construction. With QBS procurement the process requires only a
30 request for qualifications (RFQ) response, review, and award (5).

31 Alternatively, BV includes cost as scoring criteria in addition to the qualifications
32 proposal in the QBS selection process. BV procurement can be in the form of a one-step request
33 for proposal response (RFP) or a two-step RFQ and RFP response and review (5). As a means to
34 further illustrate these processes, the QBS one-step selection, BV one-step selection, and BV
35 two-step selection procurement processes are shown below in Figure 1.

36 The RFP and RFQ for the procurement models in Figure 1 request differing levels and
37 types of information. Both models require a technical proposal which includes: how the
38 contractor plans to perform the work, how the CM/GC will prequalify and select its
39 subcontractors, a preliminary schedule and/or a public relations plan, and miscellaneous
40 documents as shown above. The BV one-step statement of qualifications procurement method
41 includes an evaluation of the contractor's technical proposal in addition to proposals for the
42 construction fee, overhead and profit, general conditions also shown above (4).

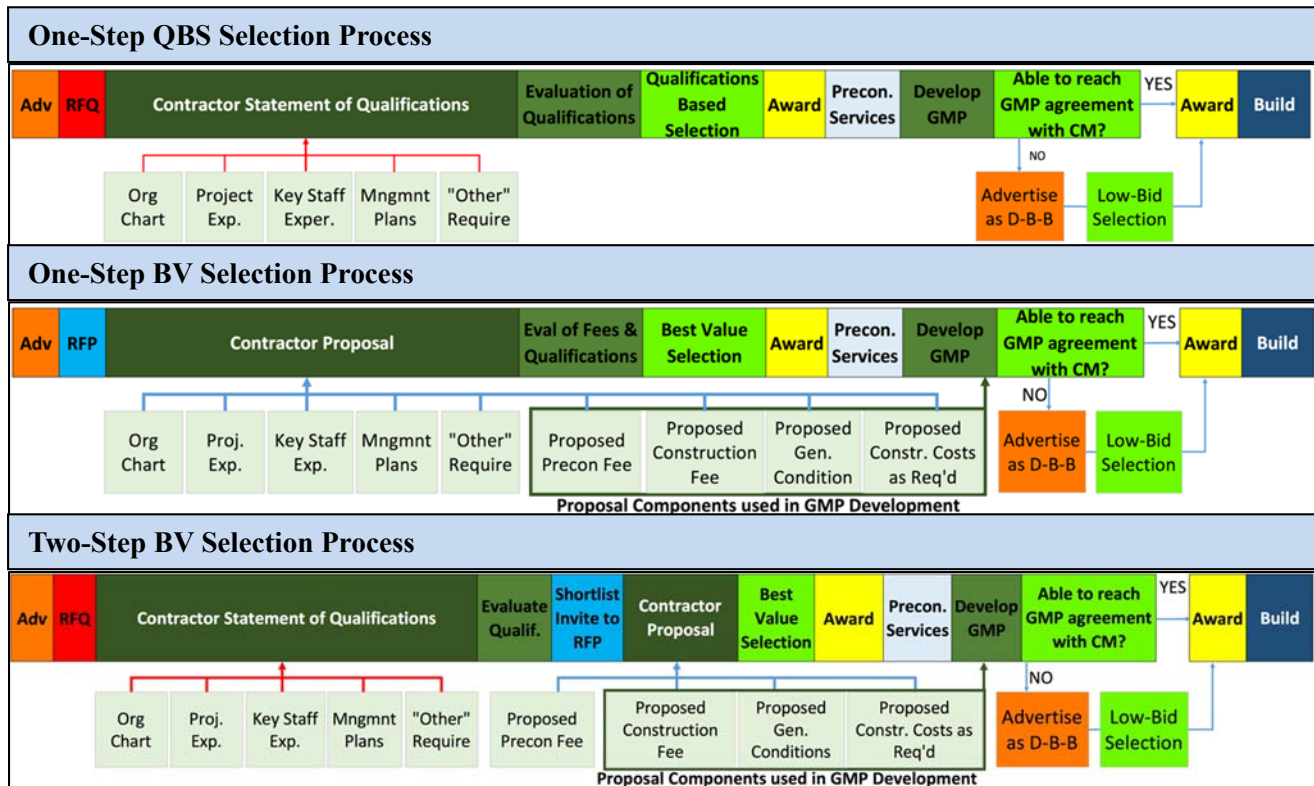


FIGURE 1 CM/GC Selection Processes (4)

Finally, the BV two-step model includes an RFQ similar to the requests of the QBS one-step model and shown at the bottom of Figure 1. The selection panel then evaluates the submittals based on evaluation criterion stated in the RFQ and invites the short-listed contractors to respond to a RFP. The selected contractors then submit their pricing factors in response to the RFP for final review and ranking in this two-step processes. The reader should also note that the proposed fees included in the BV proposals are used in part as the basis for arriving at the final cost of the project (4).

The NCHRP 402 CM/GC synthesis (4) performed a content analysis of 25 projects procurement documents from 17 states and found that the following were the most commonly included in CM/GC proposals: past CM/GC experience, qualifications of key personnel, organizational structure, past related non-CM/GC experience, references from past projects, key project plans, bonding capacity, and project manager qualifications. The NCHRP 402 synthesis stated that the qualifications of the CM/GC's personnel and past projects have the greatest perceived impact on project quality (4).

AGENCY POLICIES AND PROCEDURES

In order to understand the current industry's use of QBS versus BV, the authors performed a review of all of the CM/GC programs and CM/GC legislation in the FHWA CM/GC database (6) and additional agencies known to use CM/GC. The review included DOTs from Alaska, Arizona, California, Connecticut, Colorado, Florida, Idaho, Maryland, Michigan, Minnesota, Oregon, Nevada, Rhode Island, Tennessee, Utah, Vermont, and Washington. As seen in Table 1, eight states require a cost analysis in procurement, four allow cost as an option, and two do not allow costs to be included in the pre-construction services selection.

1 There is a tendency for states to require pricing in their CM/GC procurement. This may be
2 required by state statute, based upon concerns from the local contracting industry, and/or
3 taxpayer concerns that CM/GC proposals are competitively bid. This paper's findings that the
4 choice of BV or QBS often coincides with these factors as well as the CM/GC experience in the
5 state. This is further illustrated by the policies of the more mature CM/GC markets as seen
6 below:

- 7
- 8 • The two most experienced CM/GC agencies in the U.S. (Arizona and Utah) do not allow
- 9 BV procurement; and
- 10 • Approximately 75% of the most active CM/GC states to participate in this study
- 11 (Arizona, Colorado, Nevada, and Utah) either require or allow QBS procurement.
- 12

13 Table 1 includes legislation, manuals, and/or RFP language concerning the use of a price
14 component within CM/GC procurement. It is based on publicly available data at the time of
15 writing this paper and does not include any non-public or documentation updated after May
16 2016.

17

1 **TABLE 1 Agency CM/GC Cost in Procurement Legislation**

State DOT	Cost	Cost Language
Alaska Department of Transportation & Public Facilities	Required	“RFP will be <i>evaluated based on</i> a variety of criteria, including qualifications, past performance and <i>price</i> (7)”
Arizona Department of Transportation	Not Allowed	“The selection team shall <i>not request or consider fees, price, man-hours</i> or any other cost information... (8)”
California Department of Transportation	Either	“The preconstruction services contract <i>may include fees for services</i> to be performed during the contract period (9)”
Connecticut Department of Transportation	Required	“Enter into a single contract with a construction-manager-at-risk contractor... Award of any such contract shall be based upon the general conditions and <i>staff costs plus qualitative criteria</i> (10).”
Colorado Department of Transportation	Required	“Proposers <i>are required to submit a sealed CMGC Management Price Proposal</i> that will be evaluated based on criteria in Section 3.4 of the RFP, (11).”
Idaho Transportation Department	Required	“Contracts for the services of a CM/GC shall be awarded through a competitive process... The request for proposals <i>shall include price components</i> (12)”
Maryland State Highway Administration	Required	Competitive sealed proposals procurement method is a one step process which includes a Technical Proposal and a <i>Price Proposal</i> . (13)
Michigan Department of Transportation	Not Allowed	<i>Price is not included</i> in RFQ - negotiated after the selection of the preconstruction services per the CMGC Pre-Construction Cost Proposal Checklist. (14)
Minnesota Department of Transportation	Either	“For Best-Value procurements, the CMGC <i>fixed-markup percentage is established</i> through the RFP process... For QBS procurements, Proposer’s are <i>not required to submit a fixed-markup</i> proposal in response to the RFP (15).”
Oregon Department of Transportation	Required	“The scoring system should be fairly structured, comprehensive, and <i>consider, in addition to price...</i> (16)”
Nevada Department of Transportation	Either	“CMAR services <i>before</i> or during the design phase through a Qualifications Based Selection (<i>QBS</i>) or a <i>QBS with price component</i> (17).”
Rhode Island Department of Transportation	Required	“When procuring construction manager at-risk services for a using agency... a technical review committee shall be appointed... to evaluate the statements of qualifications, performance data, and <i>cost proposals</i> (18).”
Utah Department of Transportation	Either	Selection may be based off of <i>lowest price, best value, most qualified</i> , or other (19)
Washington Department of Transportation	Required	“The public solicitation of proposals shall include: Require <i>proposals to indicate the proposer's fee</i> for the negotiated self-perform portion of the project. (20)”
Florida Department of Transportation	No Rule	“When specific innovative techniques are to be used, the department is not required to adhere to those provisions of law that would prevent, preclude, or in any way prohibit the department from using the innovative technique (21).”
Tennessee Department of Transportation	No Rule	The legislation document does not contain pre-construction services cost inclusion rulings. However, the advertised CM/GC RFPs all include a price component (22).
Vermont Agency of Transportation	N/A	No information concerning including a price component in CM/GC procurement were found.

RESEARCH METHODOLOGY AND DATA COLLECTION

The goal of this research was to explore how and why agencies chose QBS or BV as a CM/GC procurement method and the associated opportunities and obstacles of each. To obtain these results, a two-phase research approach was taken. First, the research team conducted a high-level survey of project characteristics and performance. Second, interviews were conducted of projects that were purposefully selected from the survey data. The following is a description of the research methodology and data collection.

Project Characteristics and Performance Survey

The data gathered for this paper is part of a national study on the risks and benefits of alternative contracting methods for highway construction (23). This study collected data from 29 completed CM/GC projects. The projects were selected from DOTs which actively engage in CM/GC. These agencies included Arizona, Oregon, Colorado, Nevada, Utah, and Maine.

The data from each project was obtained through a questionnaire that was administered to the agency's project representative by email with phone correspondence as required. The quality of the data was ensured through rigorous quality control techniques as presented by Rahm and Do (24). As complexity is a rather ambiguous description, the researchers adapted the NCHRP Report 574 Recognition of Project Complexity tool to define most complex, moderately complex, and non-complex (25).

Calculations performed in the analysis of this are as follows:

$$\text{Project Duration} = \text{Substantial Completion} - \text{Contract Start} \quad (1)$$

$$\text{Award Growth} = \frac{\text{Contract Award Amount} - \text{Estimated Amount}}{\text{Estimated Amount}} \times 100 \quad (2)$$

The award growth and project duration were separated and averaged by the two procurement methods, QBS and BV. Each descriptive statistic was tested for normality within each project delivery method. Subsequently, pairwise tests for dispersion (equal variance) were performed on each descriptive statistic category within and across the two procurement models. Finally, appropriate tests for differences in the means of the cost growth and project duration among the procurement models were performed (i.e., variance equal or unequal t-tests as applicable) (26).

Project Interviews

Along with empirical findings, this study explored qualitative reasons why agencies choose procurement methods in an attempt to find best practices, opportunities, and obstacles of each. The authors chose projects from five of the six of the states that participated in the aforementioned survey with a CM/GC project that used BV or QBS. The authors also attempted to interview a range of project types, contract award value, and complexity. Due to anonymity, no individuals, projects, or states are referenced in the citations. The resulting five interviewed projects can be seen in Table 2.

TABLE 2 Project Descriptions

Project Type	Agency	Procurement Method	Complexity	Contract Award Value	Reason for interview
New Road Construction*	Utah DOT	QBS	Most	\$235,936,100	Location, high complexity, high contract value, QBS
New Bridge Construction	Oregon DOT	BV	Most	\$163,651,211	Location, high complexity, high contract value, BV
Road Rehabilitation	Nevada DOT	QBS	Moderately	\$15,541,401	Location, medium complexity, high contract value, QBS
Road Rehabilitation	Colorado DOT	BV	Moderately	\$16,495,763	Location, medium complexity, medium contract value, BV
Intelligent Transp. System (ITS)*	Arizona DOT	QBS	Moderately	\$5,754,110	Location, medium complexity, low contract value, QBS

* Interviewed both the onsite project representative and an agency CM/GC procurement facilitator representative of the project

The following topics were discussed with each of the agency representatives of the projects in Table 2.

- The project procurement, defining the use or lack of use of pricing as a selection criterion.
- Why the procurement method was chosen, specifically if there was a formalized process of selecting the procurement method.
- Benefits gained and obstacles encountered with including or excluding cost in the selection process (QBS and BV were both discussed if the representative's experience allowed it).
- Open-ended discussion on CM/GC procurement methods, focusing on best practices and lessons learned associated with including cost in the selection process, specifically the impact that it had on GMP negotiations.

RESULTS AND FINDINGS

As previously stated, this research explores how, why, and the opportunities and obstacles of agencies' use of QBS and BV. The following results present how agencies are performing CM/GC procurement to successfully choose a qualified contractor. These results stem from project representative interviews and literature. These results also discuss the opportunities and obstacles of using BV and QBS, and why each are used. These results include a presentation of the project characteristics, followed by the obstacles and opportunities for both BV and QBS procurement as found through surveys and interviews with supporting documentation from agency policies and procedures.

Submittal Requirements for Success

This research discovered four selection tools that agency representatives stated were required to ensure the most qualified contractor was chosen. These four tools were present regardless of the procurement method. These tools are supported by agency policy manuals and existing literature. The four tools include the following.

1. **Review contractor references** – According to the project representatives interviewed, references must be included in the selection criteria with a value assigned to allow the agency to understand a contractor's competency beyond their written response. Of 25 RFPs reviewed for the NCHRP 402 synthesis, 18 required references from past projects. One of the conclusions presented from the synthesis is that past project experience is one of the aspects that has the greatest perceived impact on project quality (4).
2. **Perform contractor interviews** – As stated by an agency representative, *“do interviews for your selection, to see if your contractor really gets the CM/GC values. For me those are the two most important things.”* CM/GC literature and agency manuals include interviews within the selection process (4,11,15,27,28). NCHRP 402, states the interviews can be a formal presentation of corporate qualifications/past projects, experience of key contractor personnel, project specific issues, preconstruction services components, and/or an answering of pre-published questions (4).
3. **Educate selection panel properly** – As CM/GC requires a different procurement culture (4), training of the selection panel members is important in order to choose the contractor most apt to meet the project goals. Massachusetts DOT's CM/GC manual states that all panel members should receive training on the CM/GC process prior to serving (28) and CDOT's CM/GC manual requires a pre-scoring meeting to be held to review the process including project goals, scope, and specific scoring metrics and weightings (11).
4. **Include a diverse selection panel** – In order to successfully choose a most qualified contractor within CM/GC, selection members must rely more on their cognitive abilities and experience as qualifications based selections are much more complex than low-bid. CDOT suggests the panel members consist of a program engineer, project manager, innovative contracting manager, and/or specialty personnel (11). ADOT states half the team must have their PE or AIA licensure and suggests hiring a consultant (27). A Harvard Business School paper on team processes states that homogeneous groups can cause group think and limit the problem-solving power and creativity of the group (29).

Project Characteristics and Performance of Best Value and Qualifications-Based Selection

To understand the opportunities and obstacles of BV and QBS, the authors reviewed the project characteristics and performance of the project in the survey database. While trends in the data exist, no statistical significance was found the performance criteria seen in Table 3. What follows is a discussion of relationship trends and what these trends may represent.

Table 3 depicts that QBS is being used for projects with larger cost and slightly less complex. The complexity result is counterintuitive as one would expect QBS to be used on the more complex projects. The more complex the project, the more difficult it is to develop accurate pricing early in the design process. Table 3 also shows that all QBS projects brought the contractor in prior to 35% design completion whereas BV had 2 projects above 35% and 2 projects in the 60% to 90% design completion range. It would be expected that BV is used on projects with a more complete design as an increase in design completeness reduces the unknowns and increases the ability to accurately produce pricing for a project.

TABLE 3 BV versus QBS project characteristics

	Award Value		Award Growth		Project Complexity				Design Completion at Time of RFP				
	N	Avg.	N	Avg.	N	Most	Mid	Low	N	0–20%	21–35%	36–60%	61–90%
QBS	13	\$54M	13	3.6%	14	64%	29%	7%	7	3	4	0	0
BV	16	\$31M	16	11.1%	16	75%	25%	0%	12	4	3	2	3

Also shown in Table 3 is the award growth of projects with QBS and BV procurement. Though not statistically significant at the 95% confidence level, it is an interesting trend that BV projects have greater award growth trends than QBS. As BV procurement includes price, it is expected that the estimate, developed after CM/GC procurement but before GMP, would be more accurate.

Best Value Opportunities and Obstacles

The primary BV opportunity is the perceived ability to get upfront pricing, which can be carried forward into the GMP negotiations. The NCHRP 402 owner and contractor interviews confirmed that BV created competitive pricing, though no discussion were presented about how this may equate to a more competitive GMP (4). UDOT's 2007 annual CM/GC report stated pricing was important as it introduces competition and pricing which can be used in negotiations, motivates the contractor to work through and "build" the job, and demonstrates to the public proper use of public funds (30). However, interviews revealed that that it's difficult to hold contractors to RFP prices given that assumptions can change with design progression.

This research's findings were very similar with agency representatives claiming receiving pricing as a main benefit of BV. The other stated benefits were that BV is closer to agency culture, supported by literature (4), and price acting as a differentiator between two equally qualified contractors. The following bullets summarize these findings in more detail.

- **Upfront pricing** – The use of BV procurement helps to ensure contractors understand the pre-construction and construction workload (30). NCHRP 402 CM/GC Synthesis's literature review shows that 67% of the literature cites "early knowledge of costs" as an advantage of CM/GC (4).
- **Without pricing, agency gives contractor "open check book"** – Some agency representatives stated that not having price in the procurement phase removes any chance of getting a competitive price. The CDOT CM/GC Manual states that the non-competitive negotiated construction agreed price (GMP) introduces price risk (11).
- **BV is closer to agency culture** – Although both BV and QBS require a different culture, BV is closer to agency's typical procurement process as it includes a price component. NCHRP 402 CM/GC Synthesis shows that 20% of the literature reviewed cited requiring a different procurement culture as a disadvantage of CM/GC (4).
- **Price acts as a differentiator** – Agency representatives stated that, specifically with a newer CM/GC process, there is not substantial differences between proposers' qualifications. Those agencies with little CM/GC experience also stated it was difficult to be objective with the qualifications approach. Adding a price component to the selection allows contractors to differentiate themselves and gives the agency comfort that they have a more objective selection process.

The most commonly stated reasons for choosing BV from the interviews concern more competitive construction pricing. This paper's findings do not corroborate this perceived benefit of BV. Table 3 depicts BV projects experiencing greater award growth than QBS. However, these results are not statistically significant

From this research interview findings, it appears that the BV pricing component may be its largest obstacle. CM/GC projects often undergo such drastic changes from the preconstruction services to construction award that the pricing component are often not useful in reaching a GMP. This requires a discussion as to the legitimacy of the original pricing, which can take longer and

is more complicated than a negotiation with no pre-existing pricing. The pricing component causes other obstacles which are relate to the QBS opportunities below.

Qualifications-Based Selection Opportunities and Obstacles

The opportunities of QBS best summarized by the American Consulting Engineers Council's adage, "*When multiple prices are on the table, the owner is not in control; the price is. When price is on the table it trumps other considerations, even quality and innovation*" (31). Pricing acts as a deterrent from choosing a contractor solely on quality and ability to innovate. Though not stated outright, the NCHRP Synthesis 402 alludes to this fact. One CM/GC contractor in the study stated that they cut their prices but believed that they could recover the losses by designing a project that aligned with their strengths (4). While constructability is one of the advantages of CM/GC, the contractor's first objective should be to meet the agency's overall project goals. In this case, because of the price component, the agency may have a contractor who is more interested in designing to their strengths than building a project to best meet the project goals. This aligns with another CM/GC disadvantage of NCHRP Synthesis 402 in that contractors and designers have different agendas (4).

As stated, all of the interview findings concerning QBS opportunities had to do with not including price and the potential negative impacts of including price in the selection process. The following bullets summarize these findings in more detail.

- **Ability to select solely based on contractor ability and qualifications** – The agency representatives stated that the main CM/GC benefit was the contractor's experience and innovation. The QBS procurement method allows these qualities to be the unfettered focal point of contractor selection. The NCHRP 402 CM/GC Synthesis shows early contractor involvement and design input as reasons for selecting CM/GC on all case studies and most prevalent in the literature review (3). The Arizona CM/GC process guide states that their QBS selection allows them to select the most qualified firm with no cost consideration (24).
- **It is very difficult to develop construction pricing early in project design** – The Oregon Public Contracting Coalition Guide to CM/GC Contracting (OPCC) states that "*if the GMP is set too early, many design elements are unknown and the CM/GC's contingency will be higher to account for these unknowns* (13)." Though initial procurement pricing is an entirely different discussion than GMP, the logic still holds that there are many unknowns and difficult to produce pricing. With so many unknowns, agency representatives stated that the jobs often changed so significantly from CM/GC selection to GMP that the pricing component held very little weight. There is even a risk that the contractor could give a winning low price with knowledge that changes will require renegotiation.
- **Pricing increases negotiation effort** – The authors found through interviews that having price included in the procurement can increase negotiating time due to design development causing renegotiation of pricing and discussions of original assumptions. As one agency stated, "*it was fairly clear that the price needed to be different, but it was difficult to satisfy everyone that, this is what you need to do to justify it* (23)." The OPCC and CDOT CM/GC guides promote including cost within the procurement phase, yet still discuss in detail the requirement of GMP negotiations (8, 13).
- **Price detracts focus from CM/GC innovation** – Agency representatives stated that the aforementioned increased pricing discussions can detract the focus of project discussions

away from scope, risks, and innovation for which CM/GC is often chosen for. As one agency representative stated, *“it is like you are fighting over why material price changed \$0.50/ton from the initial price instead of thinking about all of these good things you could be discussing during the preconstruction phase (23).”*

The primary obstacle with QBS procurement is receiving a fair market price without competitive bidding. This is one of the greatest challenges of CM/GC in general and specifically cited as an obstacle for QBS procurement. From the literature, manuals and interviews, this obstacle can be mitigated with the following: using an ICE to ensure a fair market project value; requesting GMP protocols in the RFP (e.g., requesting a bid template during procurement to see what type of “open-book” documentation agencies will receive from the contractor); and/or having the contractor ranked as 2nd most qualified to perform the job as an option of contract award if negotiations are unsuccessful (4).

DISCUSSION

As discovered through agency policies, legislation presented in Table 1, and supported through interviews, there appears to be an inclination for agencies and markets new to CM/GC to use BV procurement. BV procurement is closer to traditional procurement culture, allowing a level of comfort in knowing that agencies received a competitive price. However, our findings do not support the belief that a price component in procurement helps achieve a more competitive final project cost. The trend in Table 3 actually shows BV as having a greater award growth than QBS, which, though not statistically significant, may indicate that using a price component is detrimental to cost negotiations. Agency representatives stated that, in practice, the jobs often change so significantly from CM/GC selection to final construction award that the pricing component held very little weight in GMP negotiations.

The results of this research seem to indicate a trend with more CM/GC experience. It would appear that agencies and markets will begin to apply QBS on the majority of CM/GC project and retain BV for use on projects with lesser complexity. The findings in Table 1 concerning agency policies and the maturing process of the Utah market, illustrated below, support this conclusion as QBS is used more as sates gain more experience in their CM/GC markets. These conclusions are also supported through a 2013 study performed by Gransberg et. al on the evolution of Arizona, Michigan, and Utah CM/GC markets (5). An illustrative example of this trend is described with the Utah DOT in the next section.

Illustrative example of UDOT’s CM/GC Experience

As UDOT is the most experienced CM/GC agency in the U.S. It can be used to examine the potential progression of CM/GC procures as it matures nationwide. UDOT’s CM/GC process has gone full circle, beginning as QBS, changing to BV, and currently returning to QBS procurement. Please see below for the highlights of UDOT’s CM/GC procurement experience:

- **1st stage, QBS:** UDOT began their CM/GC process in 2004 with a QBS selection method. The choice to not include pricing could be an interpretation of FHWA and/or UDOT regulations, but more likely is due to UDOT mirroring the CM/GC model being used in Arizona (34).
- **2nd stage, BV:** UDOT went from a QBS to a BV CM/GC selection due to concerns of CM/GC firms incorrectly presenting themselves. As one UDOT representative stated in an interview for this study, *“we had been doing CM/GC for a while, since 2004, and at*

1 *some point in time there was a desire to have some pricing in there just to address*
2 *concerns about a ‘beauty contest’ in the proposal phase.”*

- 3 • **Current stage, QBS:** After several years of including pricing in their selection process,
4 UDOT found more hardships than benefits with the pricing component and switched
5 back to QBS. Another project representative stated, *“We were looking at, what benefits*
6 *are we getting from financials and what issues is it creating later on in the pre-*
7 *construction phase... As we matured through the process it became clearer that the*
8 *pricing information you get at the proposal period of CM/GC can almost cause more*
9 *problems than it helps with... You spend a lot of effort trying to figure out why the pricing*
10 *has changed and what the assumptions were. It was detracting from the focus of talking*
11 *about risks, reducing risks, identifying innovation that could be happening in the*
12 *preconstruction phase.”*

14 **Illustrative Example of Design-Build**

15 It could also be postulated that the CM/GC procurement process will evolve similarly to that of
16 design-build (D-B). That is, D-B has changed from low-bid award to more technical and
17 qualifications-based selection as it has matured over the past 25 years. Over the period from the
18 early 90’s to the early 00’s, D-B went through an evolution in procurement that is similar to the
19 one CM/GC is experiencing. As noted by the FHWA D-B Effectiveness Study (33) of federally
20 funded D-B projects prior to 2002, one of the primary obstacles in D-B project delivery was the
21 perceived inability to retain objectivity while using non-cost factors in determining the
22 successful proposer. From D-B’s first use in the early 90’s to the end of 2002, agencies
23 gravitated to the low-bid method to BV. Reasons for using low-bid on D-B at that time were
24 similar to those of BV procurement on CM/GC now. Agency culture and the perceived need for
25 price competition even though scope was not fully developed. However, as agencies and D-B
26 markets gained experience, agencies identified increasing the weight of performance within the
27 selection process as a way to improve the D-B performance and BV procurement began to gain
28 momentum of use throughout the U.S. (33).

29 In further support of this postulation, Colorado and Minnesota DOT’s D-B programs
30 have followed a progression similar Utah’s CM/GC procurement path. Both Colorado and
31 Minnesota started with a low-bid D-B procurement process. After seeing the need for more
32 technical- and qualifications-based criteria in their complex D-B projects, they changed to a BV
33 procurement process. However, both agencies have come full circle and now use low-bid again
34 on smaller, less complex projects (36, 37).

36 **CONCLUSIONS**

37 This paper found a variety of reasons why agencies select BV or QBS for CM/GC projects.
38 However, it found no statistically significant difference in performance between the 29 BV and
39 QBS projects in this study. The data also suggests that the decision as to whether to procure
40 using QBS or BV are not, at a statistically significant level, based on contract value, size,
41 duration, complexity, facility type, or highway type. These conclusions are consistent with those
42 reached in two recent NCHRP research reports (3,35). However, this paper did find that
43 including pricing in the selection (BV) requires a higher level of administrative effort in
44 procurement and may even be detrimental. As stated by one agency representative: *“We had a*
45 *vision of what cost was, what overhead was, and then what profit was. The contractor we ended*
46 *up with didn’t see those same breakouts. We always struggled with what those breakouts*
47 *were...”*

Although this paper's overall findings were more favorable towards the use of QBS than BV, it was found that more states are utilizing BV than QBS from a review of current state legislation and CM/GC manuals. This may be due, in part, to the relatively new use of CM/GC and this paper's finding that the choice of BV or QBS coincides with the agency's and market's CM/GC experience. This is likely due to QBS being against the traditional D-B-B agency procurement culture (4), but also may be due to state statute requirements, concerns from the local contracting industry, and/or taxpayer concerns that CM/GC proposals should be competitively bid. Based on UDOT's experience (32), interview findings, and literature on the progression of D-B procurement (33), it could be expected that, as CM/GC matures, the industry will be more open to QBS procurement. In the future, the choice of chosen procurement methods may be based on project characteristics like complexity, creating a statistically significant preference for one method over another.

The best practices for procurement identified through the interviews and previous literature were to: include verification procedures for the contractor's past projects and personnel through references and interviews; educate all those involved on the CM/GC process; and introduce language, processes, and/or tools to aid in GMP negotiation in the pre-construction selection RFP (and/or RFQ as applies) (4).

Research limitations should be considered when interpreting the results of this study. The BV fee structures in the sample population may contain significant variations. Many projects within the database are the first-to-third CM/GC project for the agency. Additionally, there were a relatively small number of CM/GC projects available for study at the time of this study. To address some of these limitations, future research should include case studies on both QBS and BV projects to better understand the agencies' decision processes and managerial differences along with what project characteristics impact this decision. This future research would allow for further and stronger development of lessons learned. The most fruitful lessons learned would focus on mitigating cost growth and streamlining agency effort.

In practice, the selection of the specific procurement approach should fit the specific project characteristics, the agency culture, state legislation, and the market competencies. Both the BV and QBS approaches have been successful in delivering a variety of CM/GC projects across a spectrum of size and complexity. While there was no statistical difference found between the two procurement methods, experience shows a trend towards BV complicating the selection decision without necessarily decreasing the risk of achieving fair market value. Therefore, it would seem that QBS procurement is the most viable CM/GC procurement option, but agencies may still choose BV on those projects with higher levels of design at the time of award.

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